

## COKE OVEN EMISSIONS

Coke oven emissions are federal hazardous air pollutants and were identified as toxic air contaminants in April 1993 under AB 2728.

CAS Registry Number: N/A

Molecular Formula: N/A

Coke oven emissions are a benzene-soluble fraction of total particulate matter produced during destructive distillation or carbonization of coal to produce coke. It consists of coal and coke particles, vapors, and tars that contain polycyclic aromatic hydrocarbons (PAH), benzene, naphthylamine, cadmium, arsenic, beryllium, and chromium (NTP, 1991).

A typical coke oven produces 80 percent coke, 12 percent coke oven gas, and 3 percent coal tar. Coke oven gas is made up of 58 percent hydrogen, 26 percent methane, 11 percent nitrogen, 7 percent carbon monoxide, and 3 percent heavier hydrocarbons (Sax, 1987).

### SOURCES AND EMISSIONS

#### A. Sources

Coke is used to extract metal from their ores, especially iron. It is also used to synthesize calcium carbide and in the manufacture of graphite and electrodes. Occupational exposure may occur during the production of coke and tar from coal or while using coke to extract metals from their ores, to synthesize calcium carbide, or to manufacture graphite and electrodes (NTP, 1991).

#### B. Emissions

No coke oven emissions from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

#### C. Natural Occurrence

No information about the natural occurrence of coke oven emissions was found in the readily-available literature.

## **AMBIENT CONCENTRATIONS**

No Air Resources Board ambient air data exist for coke oven emissions.

## **INDOOR SOURCES AND CONCENTRATIONS**

No information about the indoor sources and concentrations of coke oven emissions was found in the readily-available literature.

## **ATMOSPHERIC PERSISTENCE**

As noted above, coke oven emissions are defined as the benzene-soluble fraction of the total particulate matter produced by coke ovens. The atmospheric persistence (with half-life and lifetime where available) of a number of the constituents of coke oven emissions is discussed under the specific chemicals mentioned above.

## **AB 2588 RISK ASSESSMENT INFORMATION**

Since no emissions of coke oven emissions from stationary sources in California have been reported under the AB 2588 program, it was not listed in any of the risk assessments reviewed by the Office of Environmental Health Hazard Assessment.

## **HEALTH EFFECTS**

Probable routes of human exposure to coke oven emissions are inhalation and dermal contact (NTP, 1991).

**Non-Cancer:** Long-term exposure to coke oven emissions in humans may cause eye irritation and severe dermatitis. The United States Environmental Protection Agency (U.S. EPA) has not established a Reference Concentration (RfC) or oral Reference Dose (RfD) for coke oven emissions. No information is available on adverse reproductive or developmental effects of coke oven emissions in humans (U.S. EPA, 1994a).

**Cancer:** Epidemiological evidence of coke oven workers has shown an increase in cancer of the lung, trachea, bronchus, kidney, urinary tract, prostate, and other sites (Sittig, 1991; U.S. EPA, 1994a). The U.S. EPA has placed coke oven emissions in Group A: Human carcinogen with an inhalation unit risk estimate of  $6.2 \times 10^{-4}$  (microgram per cubic meter)<sup>-1</sup>. The U.S. EPA estimates that if an individual were to breathe air containing coke oven emissions at  $2 \times 10^{-3}$  micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) over an entire lifetime, that person would theoretically have no more than a 1 in 1 million increased chance of developing cancer as a direct result of breathing air containing this chemical (U.S. EPA, 1994a). The International Agency for

Research on Cancer has placed coke oven emissions in Group 1: Human carcinogen (IARC, 1987a).

The State of California under Proposition 65 has determined that coke oven emissions are carcinogens (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is  $6.2 \times 10^{-4}$  (microgram per cubic meter)<sup>-1</sup> (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to  $1 \mu\text{g}/\text{m}^3$  of coke oven emissions is estimated to be no greater than 620 in 1 million (OEHHA, 1994).

